

Millennium East Wind Farm EIA Report

Appendix 8.5: Watercourse Crossing Inventory and Infrastructure within 50m of a Surface Water Feature

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1 Introduction

The Proposed Development infrastructure will comprise a total of 21.6 km of access tracks of which approximately 19.4 km will be existing wind farm track. Only 2 km will be new excavated track, and 0.24 km will be new floated track. The track layout has been designed to avoid watercourses, minimise the number of new watercourse crossings and use existing access tracks where possible, with a preference for crossing of smaller scale watercourses or replacing and improving existing crossings that currently impede fish passage or restrict peak flows.

This appendix provides an inventory of collated information on each watercourse crossing including scale, dimensions, bedload, vegetation and other characteristics, along with the proposed type of crossing to be installed. At design phase, these crossings will be sized to allow for the 200-year plus climate change flows.

This appendix also provides an inventory of infrastructure within the 50 m buffers of water features (shown on 1:25,000K scale Ordnance survey mapping).

This appendix should be read in conjunction with the **EIA Report Chapter 8: Hydrology, Geology, Hydrogeology and Peat, Figure 8.6 Hydrological Features** and **Chapter 2: Proposed Development**.

2 Hydrological Context

The Site is characterised as having an existing adjacent operational Millennium and Millennium Extension Wind Farm around the ridgeline. The Proposed Development uses the existing Millennium Wind Farm access track from A887 from the River Moriston valley in the north to undulating upland terrain on a broad ridgeline mostly covered by open moorland. The Site generally slopes to the north into numerous tributaries of the River Moriston, with some areas on the ridgeline sloping to the northeast towards the River Oich catchment and southeast and south towards the River Garry surface water catchments. The majority of the Proposed Development infrastructure is located along the ridgeline towards the top of the catchment boundaries and therefore drainage comprises natural drain lines, some made man drains and minor upland watercourses.

The River Moriston to the north is designated as a Special Area of Conservation (SAC) for supporting a Freshwater Pearl Mussel population, the Aldernaig Burn catchment part of the River Garry catchment in the south is a surface water drinking Water Protection Area (DWPA) and the Loch Ness downstream is also a surface water DWPA.

There are hydroschemes on some of the watercourses downstream of the Proposed Development.

The Hydrological Context is shown on **Figure 8.1** and Hydrological Features shown on **Figure 8.6 a – f** of the EIA Report.

3 Legislative Context

The water environment includes wetlands, rivers, lochs, transitional waters (estuaries), coastal waters and groundwater. The Water Environment (Controlled Activities) (Scotland) Regulations

2011 (known as CAR), specify that it is an offence to undertake the following activities without a CAR authorisation:

- Discharges to all wetlands, surface waters and groundwater (replacing the Control of Pollution Act 1974 (CoPA));
- Disposal to land (replacing the Groundwater Regulations 1998);
- Abstractions from all wetlands, surface waters and groundwaters;
- Impoundments (dams and weirs) of rivers, lochs, wetlands and transitional waters; and
- Engineering works in inland waters and wetlands.

Watercourse crossings (engineering works in inland waters and wetlands) come under Section 6 of CAR. Three different types of authorisations under CAR allow for proportionate and risk-based regulation. The authorisation process operates at three levels which are:

- General Binding Rules;
- Registration; and
- Licence.

These levels cover activities with increasing potential impact upon the environment. Minor watercourses, which do not feature on the 1:50,000 scale Ordnance Survey mapping, are not within the remit of CAR regulations. However, these minor watercourse crossings have also been considered within this Appendix.

The Applicant will ensure that all activities remain within the General Binding Rules (Engineering Activities) identified in The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended): A Practical Guide, Version 9.3, June 2023 (SEPA, 2023). The applicable Engineering Activities General Binding Rules (GBR) and Registrations that this application shall adhere to are as follows:

- General Binding Rule 6 – Minor bridges with no construction on bed or banks;
- General Binding Rule 8 – Controlling bank erosion by green bank reinforcement or re-profiling;
- General Binding Rule 9 – Operating any vehicle, plant or equipment (machinery) when undertaking other GBR activities (which includes GBR 6 and 8).
- Registration – Bridges with no construction on bed and <20 m of total bank affected (open-based culverts would be anticipated to fall within this category);
- Registration – Where cables are not appropriately located to cross water channels via newly installed track infrastructure, it would be anticipated that a Registration would be required, as cables would be anticipated being installed via isolated open-cut technique, due to small channel size; and,
- Simple Licence – for all other bridges, fords and causeways, such as those with construction on bed and greater than 20 m of total bank affected. Larger culverts may fall within this category.

Should activities be determined to be outwith the above GBR and Registration authorisations, it would be appropriate to consider a licence application (simple or complex). The SEPA Regulatory Methods for Engineering Activities (SEPA, 2019) lists conservation and environmental standards for morphology and good practice as tests for any licence application. During the determination, SEPA shall consider the specific location, type, size and existing water quality of the local water features.

A Construction Site Licence is anticipated to be required, in accordance with the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (amended 2023). This application process shall be undertaken pre-construction, providing supplementary information to that available at the EIA Report stage.

A large and complex construction project licence authorisation from SEPA will be required as it is a development project that undertakes one or more 'controlled activity' including the discharge of water run-off from a construction site to the water environment, and is 'an onshore electricity generating station, wind farm or power station.

The SEPA large and complex construction project licence must be applied for and be granted before the activity can take place.

4 Desk Study

The majority of the northwestern section of the Site is within the Allt an Eoin catchment, the northern central area drain via the Allt a' Choire Bhuidhe, Allt a' Chaithin and Allt a' Chaise as well as multiple other tributaries into the River Moriston. The majority of the central and eastern sections of the Site drains into the Allt Phocaichain via over ten unnamed tributaries. Bog pools are common within this area.

Six percent of the Site in the western area drains into the Aldernaig Burn, which flows into the River Garry 2.4 km west of Loch Oich. The south west edge of the Site boundary follows the Allt Dail a' Chuirn which drains into the Invervigar Burn. At its most eastern point, a small area of the Site drains via multiple watercourses into the River Oich.

The desk study is a review of the information regarding the Proposed Development, principally involving an examination of the proposed track layout and the identification of watercourses marked on the OS 1:50,000 scale map which would require crossings, under the CAR Regulations, and crossings of minor watercourses as identified on OS 1:25,000 and 1:10,000 scale mapping.

This information has informed the Proposed Development design by minimising the number of watercourse crossing required across all mapped watercourses.

5 Walkover Surveys

Subsequent to an initial desk study, a walkover survey of the Proposed Development infrastructure was conducted between 8th and 9th October 2024, during which the identified crossings were visited to obtain specific information about each. Photographs and detailed field notes were taken reporting channel and valley dimensions, channel substrate and type of either the existing or proposed crossing. A hand-held Global Positioning System (GPS) unit was used to obtain locations with greater than 5 m accuracy.

Appendix 8.5 Millennium East Wind Farm – Watercourse Crossing Inventory
Fluid Environmental Consulting Ltd

The walkover survey confirmed the existence of five drains, not shown on OS mapping, but identified on aerial mapping, which would be considered drains and not additional watercourses for the purposes of this inventory:

- Two natural drains flowing into Allt Lundie from beneath the proposed location of Turbine T01.
- A natural drain that also flows into Allt Lundie from beneath the proposed location of Turbine T02.
- One drain flowing to the south of the existing borrow pit at NH 28184 08757.
- Track drainage flowing parallel and to the south of the access track between Turbine T03 and Turbine T08. This drain then crosses the access track at NH 28648 09458 where it then joins a tributary to the Allt a' Chaise.

These are shown on **Figure 8.6 Hydrological Features** in yellow.

6 Ecological Provision

For each crossing, there is provision to indicate the likelihood of the watercourse being used by mammals, principally otters, water vole, eel and fish. Where mammal or migratory fish presence is confirmed or suspected, appropriate design features will be included within the crossing design. These may include incorporation of ledges or additional dry passages to allow passage at high water levels, in-channel baffles or low water channels to aid fish passage, and other design features appropriate for the crossing location. Track design has considered good practice guidance and recommendations in the Design Manual for Roads and Bridges (Highways Agency, 2020).

7 Watercourse Crossings

A total of thirteen watercourse crossings will be used for the Proposed Development. Twelve of these are existing wind farm access track culverted watercourse crossings, and one is new. Of the twelve existing crossings, seven crossings are on watercourses shown on 1:50,000 scale OS mapping, one watercourse is shown on 1:25,000 scale OS mapping, and four are on watercourses not shown on OS mapping, but are upstream of watercourses shown on 1:50,000 or 1:25,000 scale OS mapping. These were observed as channels of flowing water during the site walkover and therefore considered as watercourses for this assessment. These existing watercourse crossings will either be re-used, extended or replaced as determined later in the design process depending on specific engineering requirements and opportunities for habitat improvement.

The new crossing (WC13 in **Table 1**) is required over a 1:50,000 scale OS mapping watercourse, located on a section of new track between T06 and T07 of the Proposed Development.

The proposed infrastructure will require a crossing of a natural drainage line for T03 and T02, T01 requires a natural drainage line to be culverted or diverted and T08 and associated earthworks required the existing track drainage to be diverted.

Watercourse crossings are listed and described in **Table 1** and shown on **Figure 8.6** of the EIA Report. The key for the sections of the figures shown within **Table 1** are on **Figure 8.6** of the EIA Report.

The new watercourse crossing will be subject to appropriate SEPA CAR licencing and will be designed to allow the conveyance of a 0.5% AP (200 year) flow event plus an allowance for climate change and freeboard. Additionally, mitigation will be put in place to control and attenuate runoff during all phases of the development and all crossings will be regularly check and maintained during operation.

8 Inventory of Infrastructure with 50 m of Surface Water

The inventory of Infrastructure with 50 m of Surface Water buffer is presented in **Table 2**.

There is no Infrastructure adjacent or within 50 m of Very High to High sensitivity watercourses or waterbody receptors.

Where existing or new infrastructure encroaches the 50 m buffer of a watercourse (see **Figure 8.6** sections labelled I1 to I5), these are all considered to be of Low sensitivity (**Chapter 8**).

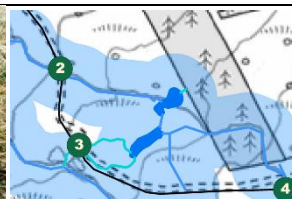
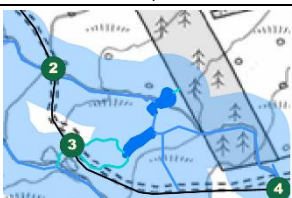
Sections of new infrastructure within 50 m of Low sensitivity watercourses include:

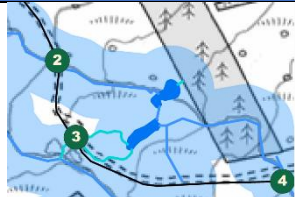
- Turbine T03 spur track earthworks (197 m2) and existing track (I1) within 50 m of an unnamed tributary of Allt a' Chaise.
- Turbine T06 approach track earthworks (43 m2) (I2) within 50 m of an unnamed tributary of Allt Phocaichain.
- Turbines T06 to T07 track approach earthworks (897 m2) (I3) within 50 m unnamed tributary of Allt Phocaichain.
- Turbine T06 new track junction and earthworks (550 m2) (I4) adjacent to linearised drain along existing track.
- Southern temporary construction compound (895 m2) (I5), existing hardstanding within 50 m of Unnamed tributary of Allt Dail a' Chuirn.

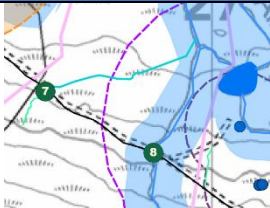
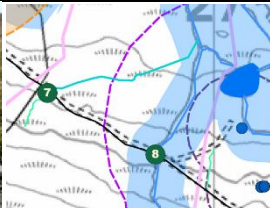
It is noted that some of the infrastructure located within watercourse buffers is associated with upgrades to the existing access track and hardstanding areas, where possible these will be undertaken on the side of the existing infrastructure further from the watercourse using embedded water management and monitoring, as outlined in **Appendix 8.1**.

Any short-term impact from sediment or peaty debris entering the sensitive watercourses downstream via one of the hill tributaries would have negligible impacts the more sensitive watercourses downstream.

Table 1 Watercourse Crossing Inventory

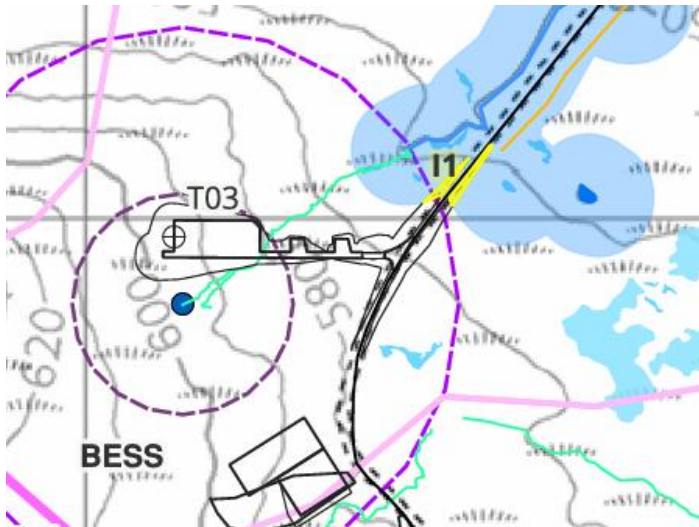
ID	Grid Reference		Watercourse Name	Infrastructure Location	Type of Crossing	Description
	Easting	Northing				
WC1	225402	811531	Unnamed Watercourse Not shown on OS mapping	By entrance to the site Existing track	Existing culvert crossing.	Channel dimensions: 0.4 m width, 0.2 m deep, moderate flow, Valley: Narrow valley, some undercutting. 0.8 m diameter, gentle gradient upstream. Moderate flow. Substrate: Cobbles.
   						
Downstream of the culvert Upstream entrance to the culvert Two small watercourses meeting upstream						
WC2	225416	811329	Unnamed watercourse Shown on 1:50k OS mapping.	Existing track	Existing crossing.	Channel dimensions: approximately 0.3 m width x 0.1 m depth. Valley dimensions: Moderate flow, undercutting present upstream. Grassy and Mossy. Substrate: Cobbles with some boulders.
   						
Upstream of the culvert View upstream Downstream of the culvert.						
WC3	225443	811219	Unnamed Watercourse Not seen on OS mapping	Existing track	Existing crossing	Channel dimensions: Predominantly linear channel, 0.3 m wide, increasing to 0.9 m wide near the culvert. 0.2 m deep. Valley: Shallow valley, undercutting present, grassy. Substrate: cobbles, some boulders.
   						
Upstream of metal culvert Upstream view Downstream of the crossing						
WC4	225739	811155	Unnamed watercourse Shown on 1:50k OS mapping.	Existing track	Existing culvert crossing.	Channel dimensions: approximately 0.8 m width x 0.3 m depth. Valley dimensions: wide valley, 2 m wide, grassy. Substrate: Boulders

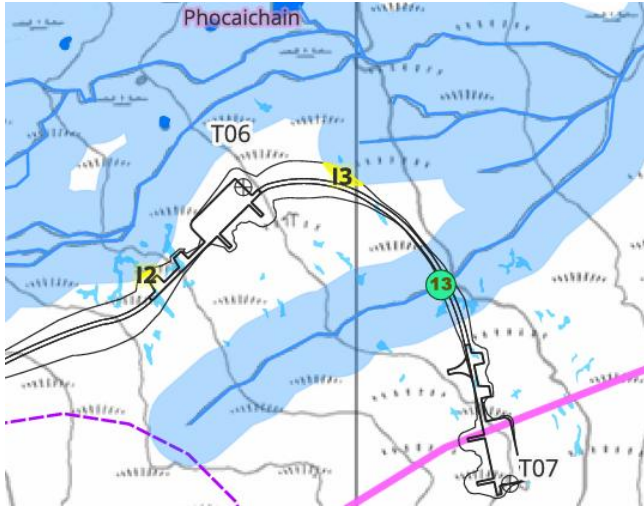
ID	Grid Reference		Watercourse Name	Infrastructure Location	Type of Crossing	Description
	Easting	Northing				
 Upstream of the crossingCulvert on the upstream sideDownstream of the crossing						
WC5	225839	810970	Unnamed watercourse, same watercourse as WC4 Shown on 1:50k OS mapping.	Existing track	Existing crossing. Culvert 60 cm	Channel dimensions: approximately 0.3 m width x 0.1 m depth. Valley dimensions: narrow channel with rushes and vegetation present, valley width 1.2 m Substrate: Cobbles, boulders
 Upstream of the CrossingCrossing upstreamDownstream of the crossing						
WC6	225776	810644	Upstream of an unnamed watercourse Not shown on OS Mapping but upstream of a 1:25k OS mapped watercourse	Existing track	Existing crossing. Two culverts, 40 cm and 60 cm	Channel dimensions: approximately 0.3 m width x 0.2 m depth, pools near the culvert 0.8 m diameter. Valley dimensions: narrow channel with rushes and vegetation present. Substrate: Cobbles, boulders
 Upstream of the crossingCrossing upstreamCrossing downstream						
WC7	226698	810343	Upstream of Allt a' Ghorstein Not shown on OS Mapping but upstream of a 1:50k OS mapped watercourse	Existing track	Existing crossing. 1.8 m plastic culvert	Channel dimensions: 0.8m wide x 0.2m depth. Northern side is straight, parallel to the track, right angle bend after the downstream culvert. Valley dimensions: Fast flowing stream. Grassy and mossy banks with valley width 1.5m. Modified channel on entry and exit of the culvert. Substrate: Cobbles and boulders.

ID	Grid Reference		Watercourse Name	Infrastructure Location	Type of Crossing	Description
	Easting	Northing				
    Channel downstreamUpstream of the crossingDownstream of the watercourse crossing						
WC8	226893	810232	Allt na Criche Shown on 1:50,000 OS mapping	Existing track	Existing crossing.	Channel dimensions:1.5 m width x 0.3 m depth. Valley dimensions: wide valley of 2.7 m. Grassy and mossy. Substrate: Boulders.
    Downstream of the crossingUpstream of the crossingChannel upstream						
WC9	227205	810078	Allt na Criche Shown on 1:50,000 OS mapping.	Existing track	Existing crossing	Channel dimensions: 1.4 m width x 0.4 m depth Moderate- Fast stream flow present. Valley dimensions: 2.7 m wide near the culvert, 0.5 m wide further upstream, grassy and peaty upstream. Substrate: Boulders.
    Downstream of the crossingUpstream of the watercourse crossingChannel upstream						
WC10	227323	810057	Allt a' Choire Bhuidhe Shown on 1:50,000 OS mapping	Existing track	Existing crossing. Plastic 0.6 m culvert	Channel dimensions: 1.5 m width x 0.3 m depth. Moderate flow. Valley dimensions: Low gradient. Grasses at watercourse banks, 2.5 m wide in places, narrower upstream. Substrate: Boulders Culvert has a large drop on the downstream side.
   Upstream of the watercourse crossingDownstream of the watercourse crossing						

ID	Grid Reference		Watercourse Name	Infrastructure Location	Type of Crossing	Description
	Easting	Northing				
WC11	228576	810063	Allt a' Chaise Shown on 1:50,000 OS mapping	Existing track	Existing Crossing 1.2 m wide overloaded culvert.	Channel dimensions: 1.5 m width channel, 0.9 m further upstream, 0.3 m deep. Fast Flowing. Valley dimensions: 2 m wide channel, heather and grass present, some moss. Substrate: Boulders.
 Upstream of the crossing Downstream of the crossing Upstream channel						
WC12	228783	809981	Unnamed tributary of Allt a' Chaise Shown on 1:25,000 OS mapping	Existing track	Existing Crossing Plastic 1.2 m wide culvert	Channel dimensions: 0.5 m width x 0.3 m deep. 1.3 m wide, fast flowing pools upstream of culvert. Valley: Slightly incised, grassy. Substrate: Bedrock and boulders.
 Upstream channel Upstream of the crossing Down stream of the crossing						
WC13	230099	808537	Unnamed tributary Shown on 1:50,000 OS mapping	New track between turbine T06 and turbine T07	New Crossing	Channel dimensions: 1 m width x 0.4 m depth, meandering and fast flowing, gentle gradient. Valley dimensions: incised, moss and grass above. Substrate: Boulders
 Upstream of crossing Crossing location Downstream of crossing						

Table 2 Infrastructure Within 50m of a Water Feature

ID	Infrastructure	Grid Reference		Water feature name	Distance to water feature	Area/length of encroachment	Description
		Easting	Northing				
I1	Turbine T03 track spur earthworks	228326	809032	Unnamed watercourse shown on 1:50k OS mapping. Unnamed tributary of Allt a' Chaise	24 m	197 m ²	Drainage can be managed within the space to avoid sediment laden discharge to the watercourse.
							
I2	Turbine T06 track approach earthworks	229751	808550	Unnamed watercourse shown on 1:50k OS mapping. Unnamed tributary of Allt Phocaichain	48 m	43 m ²	Drainage can be managed within the space to avoid sediment laden discharge to the watercourse.
							

ID	Infrastructure	Grid Reference		Water feature name	Distance to water feature	Area/length of encroachment	Description
		Easting	Northing				
I3	Turbines T06 to T07 track approach earthworks	229309	808672	Unnamed watercourse, shown on 1:25k OS mapping Unnamed tributary of Allt Phocaichain	39 m	897 m ²	Drainage can be managed within the space to avoid sediment laden discharge to the watercourse.
							
I4	New Access track and earthworks by junction leading to Turbine T06	229335	808282	Unnamed watercourse, shown on 1:25k OS mapping Linearised along track.	1 m	550 m ²	Watercourse is a result of track drainage. Upgradient and opposite side of existing track. Moving or realigning will be of low consequence.
							

ID	Infrastructure	Grid Reference		Water feature name	Distance to water feature	Area/length of encroachment	Description
		Easting	Northing				
15	Southern temporary Construction Compound	228370	808250	Unnamed tributary of Allt Dail a' Chuirn, shown on 1:50k OS mapping	22 m	895 m ²	Drainage can be managed within the space to avoid sediment laden discharge to the watercourse. Refer to Chapter 2: Proposed Development for further information.
